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(54) Sanitising/destaining/rinsing process and compositions.

(57) A sanitising/destaining/rinsing process for use in a spray washing machine characterised in that it comprises using a peroxy compound in rinse water, *inter alia*, is disclosed.

per compound;
no peroxy acids
present

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TOM OATES

SANITISING/DESTAINING/RINSING PROCESS AND COMPOSITIONS

This invention relates to a sanitising/destaining/rinsing process and compositions, more particularly for use in rinsing in spray washing machines, such as dish and glass washers.

In machine dish and glass washers, the wash programme conventionally comprises an alkaline wash, followed by a final rinse in hot water containing a rinse additive. There may be additional pre-washes or pre-rinses to these two basic operations and they may be sub-divided. In common practice, the wash temperature is 60-65°C and the rinse temperature is 80-85°C.

The use of such rinse temperatures was recommended by the National Sanitation Foundation in America in 1948/49 and the N.S.F. currently specify wash and rinsing conditions, including wash and rinse volumes, wash and rinse temperatures, wash and rinse pressures, together with minimum residence times in the rinse and wash processes for dish and glass washing machines. The recommendations on temperatures are based on the amount of heat required for thermal sanitisation. In America, the standards are often included in local regulations, but they have not per se been adopted outside North America. In many instances, the wash and rinse temperatures are alone specified in local regulations and the use of these temperatures has provided an acceptable level of sanitising.

With the increasing cost of energy, however, the use of these high temperatures has become very expensive and a considerable amount of effort has been directed towards providing dishwashing systems that will operate at lower temperatures. The sanitising action required once the temperatures have been reduced has been provided by the use of chlorine-release agents

ich are accepted as being capable of providing the cessary sanitising action. The use of available lorine as a sanitiser in the final rinse water has, wever several drawbacks. The first drawback is that not carefully regulated the residual chloride can use an increased level of corrosion. Other drawbacks clude the residues left on glassware and the odour in e. A further disadvantage is that chlorine-release ents cannot easily be included in the rinse additive at must in any case be injected into the rinse line d, therefore, two products are required to be jected into the final rinse water.

The only other chemicals that are, at present, commended for use in dish and glass washing erations are quaternary ammonium compounds and dine. Both are unsatisfactory for various reasons.

The concentration at which the quaternary mpounds need to be used causes undesirable side ffects in spray washing processes. These include eneration of foam, poor rinsing effects, absorption nto the surfaces, followed by reaction with anionic aterials, such as tannins, which causes staining, and eacti n with food soils causing problems in the ashing process. Iodine-based product cause problems ue to the reaction thereof with starch, widely present n food soil, and the fact that iodine can vaporise hen used at temperatures above 40-45°C.

It has n w been unexpectedly found that the ddition of peroxy compounds to the final rinse can rovide the extra level of sanitisation required when pray washing machines are operated at lower emperatures. The present invention may, of course, lso be applied at the conventional higher temperatures here it provides an additional safety factor should the temperatures not be met or maintained. Although per xy compounds have been recognized as bactericides for over a century they have never been widely used

because of the slow rate of bacterial kill thereof and the high concentrations required. It was only following the production, or in situ generation, of peracid compounds, such as peracetic acid, that this type of chemical has become useful economically. However, it was quite unexpected that peroxy compounds would be effective at the low concentrations and short exposure times required for use in the rinsing sections of spray washing machines.

The present invention provides a sanitising/destaining/rinsing process for use in a spray washing machine characterised in that it comprises using a peroxy compound in rinse water. Generally, the rinse water also comprises a surfactant. However, particularly when the rinsing operation is sub-divided, the peroxy compound need not always be used with a surfactant.

In conventional operation, the peroxy compound, preferably hydrogen peroxide, is generally used following one or more alkaline wash cycles. Sufficient peroxy compound may be used to provide up to 500 ppm available oxygen, preferably up to 50 ppm available oxygen, typically about 20 ppm available oxygen.

The present invention also provides the use of a peroxy compound as a sanitising/destaining/rinsing agent in rinse water of a spray washing machine. Generally, the peroxy compound is used together with a surfactant- containing rinse aid following an alkaline wash.

The present invention further provides an aqueous sanitising/destaining/rinsing composition characterised in that it comprises a peroxy compound and a surfactant suitable for use in a rinse aid. The peroxy compound will generally be used in the form of a combined composition which includes a surfactant together with the peroxy compound. Such compositions when added to

rinse water of spray washing machines may provide
ctive rinsing and drying properties, together with
ctive biocidal activity even when the machine is
ated at reduced temperatures. The combination is
erably formulated as a liquid composition and the
xy compound is preferably hydrogen peroxide.
ver, other peroxy compounds may be used, although
practical reasons they should be in a liquid form,
to prevent subsequent problems on rinsing should
include high levels or inorganic salts. It will
rally be necessary to include a stabiliser for the
xy compound in the liquid composition. The
iliser will generally buffer the composition to a
: which the per xy compound is stable (generally 2
) and will also scavenge for metal ions which tend
:stabilise the peroxy compound. Suitable
tlisers include organic and inorganic acids, alkali
t pyrophosphates and salts of tin alone or together
comp unds of magnesium or phosphorus. Any
.liser is generally used in a conventional amount.
The peroxy compound is used in the combined
)sition together with a surfactant. Preferred
:ctants are weakly foaming non-ionic wetting agents
are, for example, ethylene oxide adducts to fatty
ols or alkyl phenols or ethylene oxide adducts to
:r pylene xides of molecular weight from 500 to
c mmonly called the "PLURONICS", or adducts of
ene xide and propylene oxide with mono- or
functional initiators, commonly alcohols or amines
scribed in the book "Non-ionic Surfactants" by
K (published by Marcel Dekker, 1966) or adducts of
ene oxide, propylene oxide and/or butylene oxide
fatty alcohols or alkyl phenols.
It may als be necessary to include a solubiliser
e combined, preferably liquid, composition to
ain the remaining components in solution.
ble solubilisers, which may be used in

conventional amounts, include the low molecular weight alcohols typified by methanol, ethanol, isopropanol, propylene glycol, hexylene glycol and low molecular weight adducts of ethylene oxide and propylene oxide with mono- or multi- functional initiators, low molecular weight anionic compounds typified by the xylene, toluene and cumene sulphonates and low molecular weight alcohol phosphate esters or the phosphate esters of alcohol/ethylene oxide adducts.

The compositions according to the present invention may contain sufficient peroxy compound to provide up to 20% available oxygen, preferably from 1 to 10% available oxygen, typically about 5% available oxygen. The surfactant component may be present in amounts of up to 60% w/w, preferably from 10 to 50% w/w, typically about 20% w/w.

Such compositions may be produced by conventional means involving mixing the components in an appropriate order.

These compositions are added to the rinse water of spray washing machines, thus providing in-use solutions. When diluted with water, generally at the time of use, up to 500 ppm, preferably about 20 ppm, available oxygen, would commonly be present. In use, generally up to 500 ppm, preferably about 75 ppm, surfactant would be provided.

The present invention is illustrated by the following Examples:

EXAMPLE 1

Various rinsing processes were investigated in the rinse cycle of a HOBART AME commercial dishwasher. This uses a 45 second wash with an alkaline detergent (DIVERSEY QED) used at the rate 3 grams/litre in the wash water. The wash was followed by a 5 second dwell and a 10 second rinse using 3 litres of water at 8 psi (0.56 kg/cm^2).

The machine was used to wash plates artificially oiled with the bacteria Micrococcus caseolyticus (NCIB 251) in a starch-based soil and conditioned overnight. is ensured that the soil was not completely removed the washing process. An unwashed control had a vel of 10^5 to 10^6 bacteria. The washed plates were abbed to measure residual bacteria and the log cimal reduction in the number of bacteria was lculated following each rinsing process.

The following rinsing processes were used, the rfactant being Ethylan CPG 660:-

) Surfactant alone, at a concentration of 80 ppm, ed at a wash temperature of 60°C (140°F) and a rinse nperature of 80°C. These are the standard conditions ferred to above and it is to be assumed that they ovide adequate sanitising.

) Surfactant alone, at a concentration of 80 ppm, d at a wash temperature of 50°C (122°F) and a rinse perature of 60°C.

The surfactant together with 50 ppm chlorine (in rinse water) at a wash temperature of 50°C and a se temperature of 60°C.

Hydrogen peroxide alone, at a concentration of 20 active oxygen (AvO_2), at a wash temperature of 50°C a rinse temperature of 60°C.

Hydrogen peroxide at various concentrations, in presence of surfactant, at a concentration of 80 , used at a wash temperature of 50°C and a rinse perature of 60°C.

Hydrogen peroxide at 20 ppm in the presence of factant, at a concentration of 80 ppm, used at a temperature of 60°C and a rinse temperature of .

results were as follows:

		Mean Log Decimal Reduction
(1)	Surfactant alone (60/80°C)	4.90
(2)	Surfactant alone (50/60°C)	1.48
(3)	Surfactant + 50 ppm Cl_2 (50/60°C)	4.06
(4)	No surfactant + 20 ppm AvO_2 (50/60°C)	3.83
(5)	Surfactant (50/60°C) + 10 ppm AvO_2	4.26
	+ 20 ppm AvO_2	4.69
	+ 50 ppm AvO_2	4.67
(6)	Surfactant + 20 ppm AvO_2 (60/80°C)	4.98

A value of at least 4 is desirable.

EXAMPLE 2

The following composition according to the present invention was evaluated:

Ethylan CPG 660	20.000 pbw
Hydrogen peroxide (as 27.5%, by weight, solution in water)	55.000 pbw
Propylene glycol (solubiliser)	20.000 pbw
Disodium dihydrogen pyrophosphate (stabiliser)	0.005 pbw
Water to	100 pbw

This composition was evaluated at an in-use concentration of 400 ppm, generating 30 ppm AvO_2, and its ability for rinsing, drying and sanitising measured and compared to a conventional system using the machine and wash programme detailed in Example 1.

The results are shown below:

	LDR	Rinsing Effect	Drying Time
Conventional Rinse Aid	0.86	Good	105/110 secs
Composition according to the present invention	4.74	Good	105/110 secs

IPLE 3

Further examples of compositions according to the ent invention:

Pluriol PE6200	16.000 pbw
Pluriol PE6100	4.000 pbw
Hydrogen peroxide (as 27.5% by weight, solution in water)	55.000 pbw
Propylene glycol	5.000 pbw
Disodium dihydrogen pyrophosphate	0.005 pbw
Water to	100 pbw
Pluriol PE6200	14.000 pbw
Triton CF32	6.000 pbw
Hydrogen peroxide (as 27.5% by weight, solution in water)	55.000 pbw
Propylene glycol	5.000 pbw
Disodium dihydrogen phosphate	0.005 pbw
Phosphoric acid to	pH 4
Water to	100 pbw
Ethylan CPG 660	20.000 pbw
Hydrogen peroxide (as 35% by weight, solution in water)	28.600 pbw
Sodium xylene sulphonate (as 30%, by weight, solution in water)	7.000 pbw
Dis dium dihydrogen pyrophosphate	0.005 pbw
Water t	100 pbw

IPLE 4

The effect of the alkaline wash is demonstrated by ll wing:

The results were obtained using the method ribed previ usly, but instead of the alkaline rgent QED, mixtures of sodium tripolyphosphate, odium phosphate and sodium hydroxide were used to

generate washing solutions of varying pH. The rinsing solution contained a fixed level of 100 ppm non-ionic surfactant (Ethylan CPG 660) as rinse aid. The results are as follows:

	pH	Mean LDR
Rinse aid alone (60/80)	10	4.8
Rinse aid alone (50/60)	10	1.46
Rinse aid + 20 ppm AvO_2	7	3.88
	9	4.13
	11	4.73

This shows the improved sanitising achieved when the rinsing process according to the present invention is carried out following an alkaline wash. In all cases, destaining may be assessed visually.

In the Examples given above:

Ethylan CPG 660 (Diamond Shamrock) is a propoxylated alcohol ethoxylate.

Pluriol PE6200 and PE6100 (BASF) are block copolymers of the Pluronic type.

Triton CF32 (Rohm & Haas) is an amine polyglycol condensate.

Claims

1. A sanitising/destaining/rinsing process for use in a spray washing machine characterised in that it comprises using a peroxy compound in rinse water.

2. A process as claimed in claim 1 wherein a surfactant is also used in rinse water.

3. A process as claimed in claim 1 or claim 2 wherein the use of the peroxy compound follows an alkaline wash.

4. A process as claimed in any of claims 1 to 3 wherein the peroxy compound is hydrogen peroxide.

5. A process as claimed in any of claims 1 to 4 wherein sufficient peroxy compound is used to provide up t 500 ppm available oxygen.

6. A process as claimed in claim 5 wherein sufficient per xy compound is used to provide up to 50 ppm available xygen.

7. A process as claimed in claim 6 wherein sufficient peroxy compound is used to provide about 20 ppm available oxygen.

8. An aqueous sanitising/destaining/rinsing comp sition characterised in that it comprises a peroxy compound and a surfactant suitable for use in a rinse aid.

9. A composition as claimed in claim 8 wherein sufficient per xy compound to provide up to 20% available oxygen is present and/or up to 60% w/w surfactant is present.

10. A composition as claimed in claim 9 wherein sufficient peroxy compound to provide from 1 to 10% available oxygen is present and/or from 10 to 50% w/w surfactant is present.

11. A composition as claimed in claim 10 wherein sufficient peroxy compound to provide about 5% available oxygen is present and/or about 20% w/w surfactant is present.

12. A composition as claimed in any of claims 8 to 11 wherein a stabilizer and/or a solubilizer is/are present.

13. An in-use sanitising/destaining/rinsing solution characterised in that it comprises a composition as claimed in any of claims 8 to 12 diluted with water to provide up to 500 ppm available oxygen and/or up to 500 ppm surfactant.

14. A solution as claimed in claim 13 wherein about 20 ppm available oxygen and/or about 75 ppm surfactant is/are provided.

15. The use of a peroxy compound as a sanitising/destaining/rinsing agent in rinse water of a spray washing machine.